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GEOPHYSICAL EVIDENCES FOR A THICK CRUST SOUTH OF PALGHAT-TIRUCHI GAP IN THE HIGH GRADE TERRAINS OF SOUTH INDIA; D.C. MISHRA National Geophysical Research Institute, Hyderabad 500 007, India.

The Bouguer anomaly map of India presents a prominent low (30-40 mgls) over the southern part of the continent (N.G.R.I., 1978) which coincides for a considerable part with the exposed charnockites (Fig. 1a, Subrahmanyam and Verma 1986). North of this 'low' is an east-west, elongated 'high' of approximately 20 mgals almost perpendicular to the regional strike in the area. A fraction of these anomalies might be due to the shallow features but their large wavelengths suggest mainly deep seated sources. Significantly the gradient between these two anomalies coincide with the Palghat-Tiruchi line which is a prominent shear zone (Naqvi and Rogers 1987). The northern gradient of the Bouguer 'high' coincides with the Bhavani fault almost parallel to the Palghat-Tiruchi line which suggests its extension to a considerable depth. The occurrences of anorthosite bodies on either side of this gravity 'high' (Fig. 1a) also suggest a deep-seated origin for this anomaly. Topographically also, Palghat and Tiruchi depicts gaps in the western and eastern ghats respectively which might be manifestation of deep-seated structures.

A north-south profile across this 'high' and 'low' (Fig. 1b) present a kind of Bouguer anomaly which is characteristic of the variations in the Moho signifying changes in the crustal thicknesses, 'low' corresponding to a thick crust and 'high' a thin one (Mishra et al. 1987). This inference has been supported also from deep seismic sounding studies in different tectonic regimes of the country including Peninsular Shield (Kaila et al 1979). In this regard the occurrence of this 'low' over the high grade terrain of S. India is very significant as it suggests a thick crust in this region. Such a situation under high grade terrains can arise only if the crustal accretion has taken place after the erosion of the upper crust or due to under-plating along a shear zone or old suture zone as described by Fountain and Salisbury (1981). The absence of oceanic sediments or volcanic and ultramafic rocks or their equivalents in this area does not favour the latter possibility of a suture zone. The Palghat-Tiruchi line may not be a true suture zone but can be considered as line of juxtaposition between two blocks as has been described by Thomas and Tanner (1975), inside 100 km of

the Grenville Province.

The magnetic characteristics (Suryanarayana and Bhan 1985) around Palghat also changes significantly. The southern part depicting more intense magnetic anomalies than the northern part. MAGSAT has also shown an anomalous magnetic crust in this region (Mishra and Venkatrayudu 1985). The Palghat-Tiruchi line separating the 'low' and the 'high', therefore is very significant representing probably the junction of two blocks during the pre-cambrian period. These blocks might have over ridden each other forming a thick crust towards the south from which even if the upper part is eroded away the remaining part is still thicker than a normal crust. The Bhavani fault towards north might have formed during this process sympathetic and parallel to this line. A closely-spaced profile recorded recently across these anomalies will be modelled and presented in the workshop to highlight the variations in the physical parameters and crustal thicknesses in the region.

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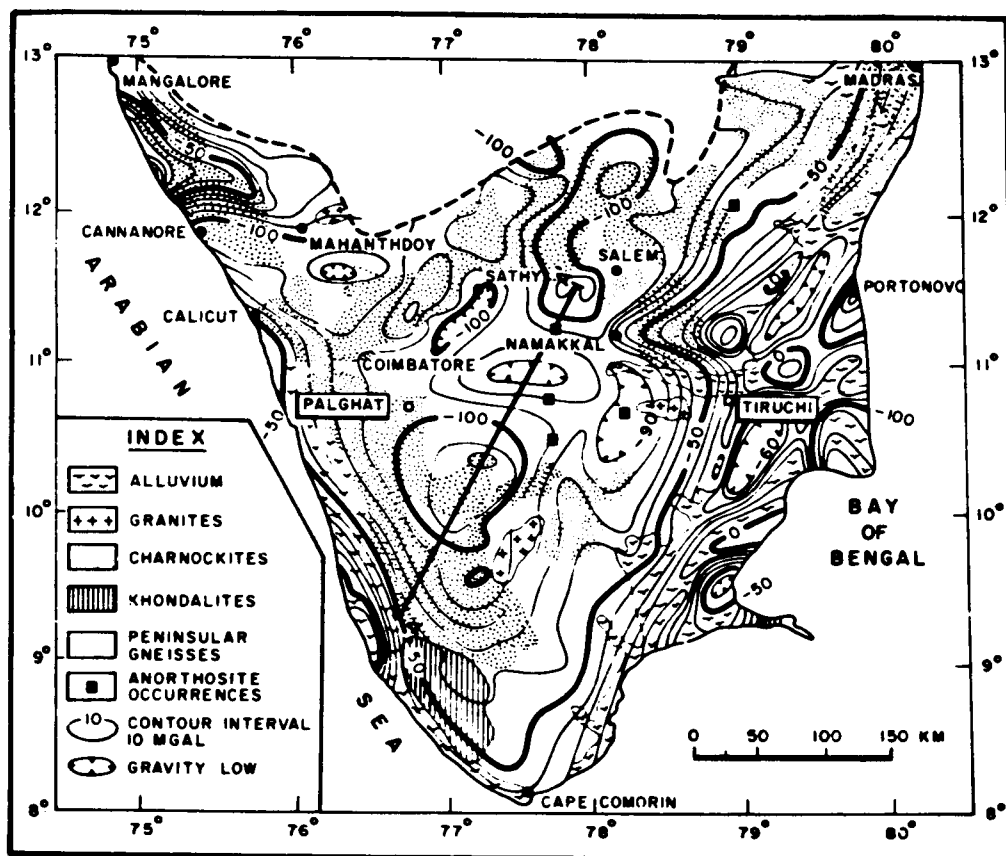


Fig.1a. BOUGUER ANOMALY MAP OF HIGH GRADE TERRAIN OF SOUTH INDIA

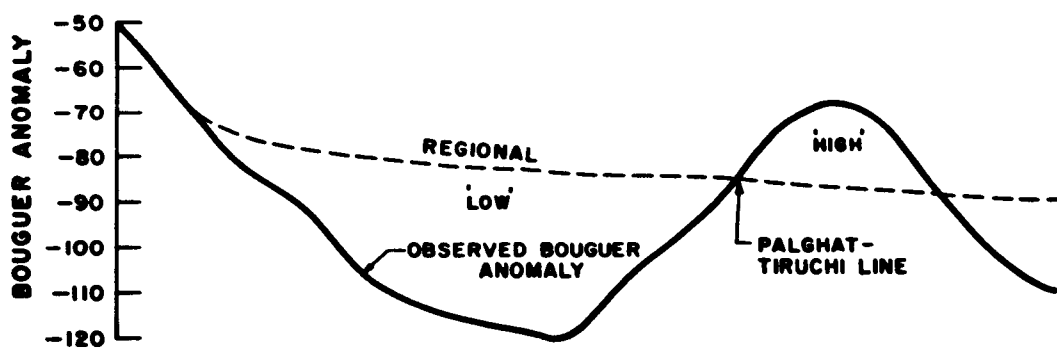


Fig.1 b. BOUGUER ANOMALY PROFILE A A'

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